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ISSN 2454-3230
Indo Western Research Journal (IWRJ)
Issue : XVII, Vol
Sept. 2022 To Feb. 2023

Research Paper

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Zoology

Pond Ecosystem of Nagapur Dam Parali (V)

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Introduction

Ecosystem, the complex of living organisms, their physical environment, and all their interrelationship in a particular unit of space. An ecosystem can be categorized into its abiotic constituents including minerals, climate soil, water Sunlight & all other non-living elements & its biotic constituents, consisting of the all living organisms

Linking these constituents together are two major forces the flow of energy through the ecosystem cycling of nutrient within the ecosystem. The pond ecosystem is fresh water environment That can reveal the health of local area. fresh water environment, such as pond ecosystem have specific life forms that shows its overall health Toxins or pollution can affect the pond ecosystem, adversely, the importance of understanding the pond ecosystem involves the life form of plant culture that are part of healthy Environment, The pond ecosystem begins with what lives in the water from the smallest microbes, single cell culture to the guppies and planktons.

Only clean water can sustain life. The plants that Convert oxygen for these cultures used as important as the fauna. The healthy pond ecosystem will have balance of both plant & animal leaving with its parameter. Studying the balance between the plant, animals and soil sedges & underlying strata can give overall view of quality of water table with human activity impacting on the pond environment. toxins can affect the pond ecosystem. If toxin affect the water-plant can die without plants to add oxygen to the water the culture might perish. without the smallest life form in the good chain, the ripple effect lead to other species dying out or leaving the pond environment, Leeches have long been an indicator of pond ecosystem health status Leeches are found where water quality is good. If the pond ecosystem is not balanced or there are impurities in water that the life can not deal with then one of the first suffered or

ive, without clean & clear water filtered by ample plant life or good drainable soil the larger animal need to find other sources of water.

Agriculture and impact of human activity on pond ecosystem can affect the quality & purity of soil & water. Fertilizer, oil, introduced species, pollution fishing can all upset the delicate balance that exist in healthy pond ecosystem maintaining the balance keeping every species alive & good number will ensure a healthy vital pond ecosystem. freshwater, climate, drought humidity, salinity are all important factors that can affect the pond ecosystem beyond the initial impact on human activity.

The food chain from tiny water born cultures that feeds midges & insect that feed birds to the rabbits that feed foxes & the grasses that feed cattle & sheep all depend on ecosystem to sustain there lives

Objectives

1. Create a model of pond food web demonstrating and understanding interrelationship of plant & animals in pond.
2. Understand that pond is an ecosystem that provide food, water, shelter for variety of plants & animal to live & reproduce
3. Understand pond is an essential place for many animals during part or all of their life cycles.
4. Understand that some animal migrate during their lives therefore depends on more than one habitat.
5. Create a field guide to pond to share with Community
6. Understand that organism have specific adaptation characteristic to survive, & describing some example, of aquatic animals.

physical parameters

A. Temperature:

The water temperature, oxygen content and the material at the bottom of pond influence the kind of life in pond. As depth of pond, increases the temperature of water gradually decreases due to gradual decrease in light penetration Temperature on Nagapur Dam ranges from 28°C to 38°C In summer it will be up to 38°C & in winter it will goes down upto 27°C.

B. Light

Light serves as main abiotic component required for photosynthetic activity of phytoplankton The lateral zone has maximum light penetration whereas profound zone has Least light penetration stratification is one of the characteristic features of pond ecosystem that

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determines the availability of essential abiotic factors such as light, oxygen, minerals.

Chemical parameters

A. Oxygen content of pond water

Without oxygen life on earth in its present form would not be possible. This also applies to for life in water & thus to your pond; pond water is provided with oxygen through the certain number of sources in sequence of importance they include. Through the water surface by diffusion especially water which is moved by wind & rain absorb much oxygen from atmosphere. By growing underwater plants, especially so-called oxygen producing plants can produce huge amount of oxygen under favourable circumstances by any algae present. colder water can contain more oxygen than warmer water, in general upper water layers contain more oxygen than deeper water layer

- i. Estimation of O₂ from given water sample in pond
- # Aim:- Estimation of O₂ from given water sample.

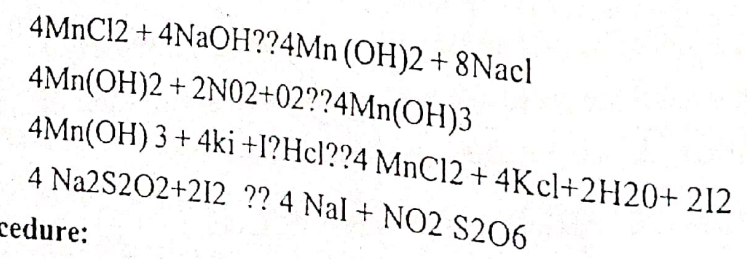
Chemicals:-

Wrinkle's solution A (40 gm magnase chloride) 100ml distilled water, sodium thiosulphate (Na₂S₂O₃) Hcl, starch solution.

principle:-

O₂ in the pond water generally estimated by using wrinkle's method this technique is based on fact i.e. magnase chloride is added to known volume of water containing dissolved oxygen, a protein will be converted in to magnase hydroxide this is dissolved in nonoxidizing acids such as HCl &, mode of reach is with potassium iodide so that equivalent quantity of iodine is liberated when starch solution is added it reach with liberated iodine & produce blue colour due to absorption. Titrate this solution again a standard solution Sodium thiosulphate. Colour disappear due to binding of iodine as sodium iodide.

#Reaction



#Procedure:

fill the reagent bottle completely with given water sample stopped it & care should be taken that there will be no air bubble & add 1ml wrinkle solution A with pinette stopped bottle & shake well & keep side to after about 5-10 min add 1ml Dist. Parahydrogen reagent bottle to dissolve the ppt if ppt is not dissolved.

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#Observations:

No.	Temperature	volume of water in sample in ml	Burate reading	Final reading
1	27 C	100ml	6.7	6.7
2	27C	100ml	6.7	6.7

#Calculations

volume of water sample = 100 ml
 volume of Na₂S₂O₃ = 100ml = 6.7ml

Volume of Na₂S₂O₃ x normality of Na₂S₂O₃

Nomality of oxygen = _____

Volume of water.

$$= \frac{0.008833 \times 6.7}{100}$$

100

$$= 5.918 \times 10^{-4}$$

mass of oxygen in 1 lit water sample
 = normality of O₂ x weight of O₂ x 1000
 = 5.918 x 10⁻⁴ x 8 x 1000
 = 4.73 mg/t

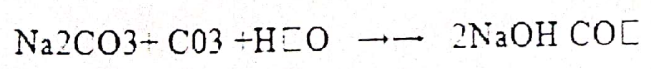
#Result:

The amount of oxygen in pond water = 4.73 mg

B. Estimation of CO₂ from given water sample in pond.

Estimation of CO₂:

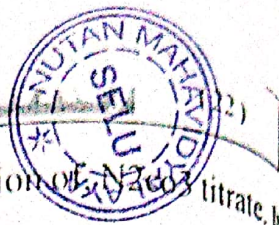
The amount of neutral bottle will generally vary inversely with dissolved O₂ when living plant & animal are present free O₂ will occur in acid water. If the solution of sodium carbonate added to the sample the O₂ will form carbonate



ph is suitable indicate for this reaction since it is in presence of bicarbonate but turns pink when free carbonate occurs.

Procedures: In 5 ml of sample add few drop of ph indicator. development of pink colour

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indicator of free co₂ if sample Colourless of acidic due to formation of Na₂CO₃ titrate. h
 against 0.2N, NaOH end point colourless to pink

#Observation table

Sr.no.	Volume of Sample	BURATE READING			MEAN
		---INITIAL---	---FINAL---	DIFF	
1	50ml	0ml	8ml	8ml	8/16
2	50ml	0ml	8ml	8ml	
3	50ml	0ml	8ml	8ml	

#Calculation:

Co₂ in at mg/lit at NTP
 Vx70/m
 8.16X70/50
 571.2/50
 =11.42 mg/lit.

#Result: :

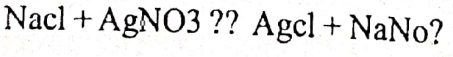
The amount of co₂ in given water sample is 11.42 mg/uit at NT

Estimation of chlorinity & salinity of of pond water

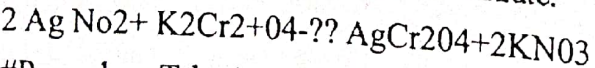
#Principle:

"In neutral or slight alkaline solution potassium-chromate can be used to indicate the end point of silver nitrate solution for the titration of chloride

Silver chloride is continuously precipitated before red silver chromate is formed, here silver nitrate reacts with chloride informing silver chromide & sodium nitrate



When the all salt NaCl is exhausted the indicator Potassium chromate react with silver nitrate forming silver chromate & potassium nitrate.



#Procedure: Take 10 ml of sample water, add peed drops of k₂Cr₂O₇ an indicator & titrate this sample against 0.02 NaGNo₃ solotion the end ppt is yellow to blackish red, take down the reading

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Observations:

Sr.	Volume of sample	BURATE		READING		mean
		Initial	final	diff		
1	10ml	0.0	3.1	3.1		
2	10ml	0.0	3.2	3.2	3.26	
3	10ml	0.0	3.5	3.5		

The amount of CO_2 in given water sample is 11.42 mg/lit at HIP

#Result: -

Chlorinity of the given pond water is 46.22mg/lit

Salinity of the given pond water is 84.81 mg/lit

Biological parameters

Water is essential to life on this planet. fresh water & the quality of fresh water in pond ecosystem is actually of global importance

Biotic zone of pond:

1. Littoral zone:

Emergent plants are those producing biomass above & below water level. The littoral zone is the water closest to shore the water in the littoral zone is generally shallow enough for sunlight to penetrate, allowing photosynthesis Producer, in this zone include both phytoplankton & plants that floats in the water they provide good, oxygen & habitat to other aquatic organism The littoral zone generally have high productivity, high biodiversity

-Rooted plant species occupy it animal species includes reeds, snails, insects etc.

2. Limnetic zone:

The limnetic zone refers to the open water of pond with effective penetration of light this zone is dominated by phytoplankton. animal species mainly includes small fishes & Insects

3. Profundal zone: The region of pond below the limnetic zone with no effective light penetrationsome amphibians occupy in it.

4. Benthic Zone: The bottom zone of pond is benthic & is occupied by community of decomposer. the decomposer is benthos.

from nutrition point of view the biotic component can be grouped in to two basic components.

i. Autotrophic component

ii. Heterotrophic Components

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facture food from inorganic substance the heterotrophic components includes non green plant & all animals which take food from autotrophs. sobiotic Components can be described under the following three heads.

i. Producers: The producer are autotrophic elements chiefly green plants they use radiant energy of sun in photosynthetic process whereby Carbon-dioxide is assimilated & the light energy is converted in to chemical energy The chemical energy is actually locked up in energy rich carbon compound. Oxygen is evolved as a biproduct in photosynthesis, The main producer in pond ecosystem are algae & other aquatic plants such as Azola, Hydrilla, Typha, algae, Aquatic weed, Ipomoea carnea,

ii. Consumers: In pond ecosystem the primary consumer are tadpole, larval of frog, fishes & other aquatic animals which consume green plant & alga there, food. These herbivores, aquatic animals are the food of secondary consumer, frogs, big fishes, watersnakes, crabs are Secondary consumers there are higher order consumers such as water birds turtles etc.

There are three different categories of consumers.

- primary consumer - consumer of first order
- Secondary consumers - Consumers of Second order
- tertiary consumer - Consumer of third order
- parasites, scavengers & saprobes

a. Primary consumers; These are purely herbivorous animals that are dependent for their food on producer or green plants Zooplanktons, tode poles, small fishes are primery consumers

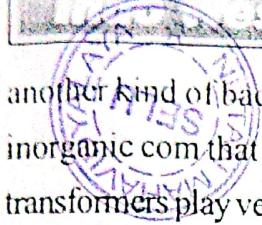
b. Secondary consumers: These are carnivores & omnivores, commonly are the flesh-eating animals omnivores are the animals that adopted to consume herbivores as well as plants as their food
e.g.- fish, larvae of insects, birds etc.

c. Tertiary consumers: These are top carnivores which carnivores, omnivores & herbivores. pray upon other

Beside different classes of consumer the parasitic, Scavengers & saprobes are also included in consumers the parasitic plant and animal utilize the living tissue of different plant and animal
scavenger and saprobes utilize dead remain animals & plants as there food

d. Decomposers and transformers:
Decomposers and transformers are living component of ecosystem & they are fungi & bacteria decomposer attack on the dead remain complex organism & they are degraded

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e. Degraded

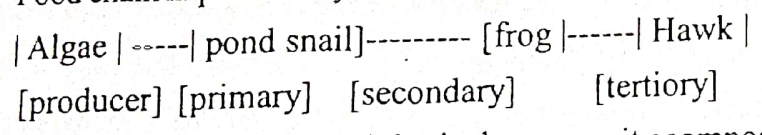


another kind of bacteria. The transformers which change these organic compounds up to inorganic com that are suitable for reuse by producer or green plants The decomposers & transformers play very imp role in maintaining dynamic nature of ecosystem

Abiotic components:

Ecological relationship are manifested in physiochemical environment a biotic component of ecosystem include inorganic element & compound such as soil, water, oxygen, calcium carbonate, phosphate & variety of organic compound It also include such physical factors & ingredients as moisture wind, current & solar radiation radiant energy of sun is the only significant energy source for any ecosystem the amount or non-living component such as Carbon, phosphorus, nitrogen, that are present at any given time is known as standing state or standing quantity. The main factor of pond includes water quality temperature, light, soil, and seasonal change. pond ecosystem are the balance of fish, bacteria's, plants and birds which together support each other

Food chain in pond ecosystem:



An ecosystem is biological community composed of apparent type of organisms interacting with each other & surrounding environmental condition. We see many living micro-organisms living around us on various habitat such as land, ocean, forest, pond, Lake deserts etc. All organisms adapted to these respective habitat A well demarked, area formed by rain or overflowing water is called pond .It serve as habitat for deferent aquatic organisms that interact with each other and surrounding environment and constitute the The water in pond ecosystem is stagnant either natural or artificial boundaries surround the pond ecosystem pond ecosystem exhibit wide range of Varity in these size Some organisms which are found in Nagapur dam parli Producer found in Nagapur Dam

Algae:

Algae belonging to kingdom protesta are largely aquatic organism, largely aquatic organism that are typically photosynthetic but differ from plant in that they lack true roots, stem, leaves & gametes. Algae can vary in size from less than 2 mm to over cop feet tall, but in pond ecosystem it is Small size. The green algae is present in this dam which indicate good water quality green algae belonging to family Chlorophyta is most diverse group of algae over 2000 species. green algae are base of food web, there chloroplast Contain chlorophyll-A & B accounting there typical bright green colouration green algae also a primary producer several planktonic

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various, taxa.

Algae are main primary producer in all kind of water bodies green algae indicator of organic pollution in Nagapur clam planktonic algae is found in large quantity in this dam common name-Chlamydomonas free floating & microscopic having some algae is beneficial. but certain strain or excessive amount can be detrimental So should be carefully monitored & controlled.

Typha orientalis:

Typha orientalis, commonly known as bulrush Camboge or raupo is a perennial herbivory plant in genus Typha It is a wetland plant that grows on the edges of ponds, lakes, salt marshes & slow flowing river It is found on the edges of this dam in moderate range

Ipomoea camea:

(Beshram) It is species of morning glory that grows as blush this flowering plant has heart shaped leaves, that are reach green & 6-9 inches long. it can be easily grown from seeds are toxic & it can be hazardous, toxicity related to swain nine produced by endophytes Ipotea contra are commonly found on the edges of Nagapur dam it is widely spread over all. contains component identical to marshilin.

Some commonly found fishes on Nagapur Dam

#Catla-Catla

characters:

1. It is fresh water fish found in rivers of India, Bangladesh (Burma)
2. Body is deep with prominent head
3. Mouth is large and upturned, lips are thick non fingered barbules are absent
4. A single broad dorsal fin with 4-5 branchial rays
5. Body is greyish black at dorsal side & silvery white at lateral & ventral side. Food & feeding habits:
6. It is surface feeder fish & feeds on planktons Growth & growth rate.
7. Catla is fastest growing fish among the Indian major carps. growth rate: In first year grows up to 19 cm < weight 6-7 kg in 3rd year maturity, fecundity & breeding It attain maturing at the end year and breed at the age of old year

eggs & hatching:

The eggs are light, red & white in colour eggs are transparant & non adhesive.

Economic importance:

It is an important food fish.

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characters:

Rohu is large silver coated fish or typical crip Shape with arched head"

Adult can reach maximum weight about 45kg & maximum length 2m but average around 0.5m

Distribution & habitat.

The Rohu occurs in rivers throughout much of Northam & central-eastern India.

Ecology

The species is an omnivore with specific food prefferanceat different lifestages.

During the early stage of life-cycle it eat mainly zooplanktons but as grows it eat more and more phytoplanktons.

it has modified thin hairlike gill ranker suggesting that it reeds by sieving the water

Rohu reach sexual maturity between 2 to 5 years They generally shown during monsoon season

Economic importance:

Rohu is very commonly eaten in Bangladesh, Nepal, Pakistan & India.

#Tilapia

Commonname:-chilapi

Species: cichlid

It is economically most important species placed in coptodoni & oreochromine Tilapia is mainly freshwater fish inhabiting shallows streams, ponds, rivers & lacks.

Charactristics:

---Tilapia typically have laterally compressed deep bodies like other chichilids

----There lower pharyngeal bones are used into a single tooth baring structure

----Typically Tilapia have a long dorsal fin & Lateral line that of ten breaks towards the end of dorsal fin

---other than their temperature sensitivity tilapia exist or can adapt to very wide range of condition

Economic importance:

Tilapia are some of several commercially important aquaculture species that are susceptible to offflavours.

food they consume:

They consume floating most aquatic plants Such as algae, duckweed.

Decomposers:

Fresh water ponds are self-sustaining bodies of water decomposers play. an important role in

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this type of ecosystem

Decomposers breakdown all sort of organic waste, ranging from the smallest or life the largest on decaying fish they tend to play multiple role in the food chain. There was consumption recycles all the spent nutrient & transform them into consumable material. without them fresh-water ponds quickly become. Pod of toxic tank some examples are:-

1) Aquatic worms:


Several types of comms can live in fresh water pond. many of these are closely relate to terrestrial species but have adaptations that allow them to live a pully submerged existence

2. fresh-water gastropods: -

Snail & sludge are commonly pound in this Pond They also good on rejected fish food & pond debris

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